Bellwork: 4/5/13

Simplify the following expression: LCD: $(x-4)(x+3)(x+1)$

$$\frac{4x}{x^2-x-12} - 1\frac{(x+2)}{x^2-3x-4} =$$

$(x+3)\boxed{(x-4)}\boxed{(x-4)}(x+1)$

$$\frac{4x(x+1)}{(x+3)(x-4)(x+1)} \quad \frac{-1(x+2)(x+3)}{(x-4)(x+1)(x+3)} =$$

$4x^2+4x \quad -1(x^2+5x+6)$

$$\cancel{4x^2}+\cancel{4x}-\cancel{x^2}-\cancel{5x}-6 = \frac{3x^2-x-6}{(x-4)(x+3)(x+1)}$$

ALGEBRA 2

NOTES 8.4 - Part 3

NAME ________________

PERIOD ________________

SOLVING EQUATIONS INVOLVING RATIONAL EXPRESSIONS

The ***best*** way to solve an equation involving fractions is to clear the equation of fractions. This can be done by *multiplying* ***each term*** *by the* ***LCD***.

Example 1: $\frac{x}{3}+\frac{3x}{4}=\frac{2}{1}$

LCD: $3 \cdot 4 = 12$

$$\frac{x \cdot 4}{3 \cdot 4} + \frac{3x \cdot 3}{4 \cdot 3} = \frac{2 \cdot 3 \cdot 4}{1 \cdot 3 \cdot 4}$$

$$4x + 9x = 24$$

$$\frac{\cancel{13}x}{\cancel{13}} = \frac{24}{13}$$

$$\boxed{x = \frac{24}{13}}$$

Example 2: $\frac{2x}{5}-\frac{2}{3}=\frac{4x}{15}+\frac{1}{5}$

$3 \cdot 5$

LCD: $3 \cdot 5 = 15$

$$\frac{2x \cdot 3}{5 \cdot 3} - \frac{2 \cdot 5}{3 \cdot 5} = \frac{4x}{15} + \frac{1 \cdot 3}{5 \cdot 3}$$

$$6x - 10 = \cancel{4x} + 3$$

$$-4x \qquad -\cancel{4x}$$

$$2x - \cancel{10} = 3$$

$$+\cancel{10} \qquad +10$$

$$\frac{\cancel{2}x}{\cancel{2}} = \frac{13}{2}$$

$$\boxed{x = \frac{13}{2}}$$

Recall: Division by 0 is undefined!! (Zero cannot be in the denominator.)

Therefore, whenever a rational expression contains a ***variable in the denominator,*** it is first necessary to ***eliminate any values that would make the denominator equal to 0.*** To find the values that should be eliminated, called ***restrictions***, factor each denominator and then set each different factor of the denominators equal to 0 and solve for *x*.

Example 3:

$$\frac{1}{x-2} = \frac{3}{x+2} - \frac{6x}{x^2-4}$$

LCD: $\underline{(x+2)(x-2)}$

$(x-2) \quad | \quad (x+2) \quad | \quad (x+2)(x-2)$

Restrictions:

$x-2=0$ $\quad$ $x+2=0$

$+2 \; +2$ $\quad$ $-2 \; -2$

$x=2$ $\quad$ $x=-2$

$x \neq$ $\underline{2, -2}$

$$\frac{1(x+2)}{\cancel{(x-2)(x+2)}} = \frac{3(x-2)}{\cancel{(x+2)(x-2)}} - \frac{6x}{\cancel{(x+2)(x-2)}}$$

$$x+2 = \cancel{3}x - 6 - \cancel{6}x$$

$$x+2 = -3x - 6$$

$$+3x \qquad +3x$$

$$4x + 2 = -6$$

$$-2 \qquad -2$$

$$\frac{\cancel{4}x}{\cancel{4}} = \frac{-8}{4}$$

$x = -2$

$\boxed{\text{no solution}}$

The solution appears to be −2. However, -2 is a restricted value because it would make at least one of the denominators of the original equation zero. Therefore, this solution must be eliminated which means that this equation has ***no solution.***

$x \neq \underline{2, -2}$

$x = \underline{\cancel{-2}}$ no solution

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5.

$$\frac{5}{x+2} = \frac{5}{x} + \frac{2}{3x}$$

$(x+2) \quad | \quad \boxed{x} \quad | \quad 3 \cdot \boxed{x}$

LCD: $\underline{3x(x+2)}$

Restrictions:

$x=0$ $\quad$ $x+2=0$

$x=-2$

$x \neq 0, -2$

$$\frac{5 \cdot 3x}{(x+2) \cdot 3x} = \frac{\overset{15(x+2)}{5 \cdot 3(x+2)}}{x \cdot 3(x+2)} + \frac{2(x+2)}{3x(x+2)}$$

$$15x = 15x + 30 + 2x + 4$$

$$15x = 17x + 34$$

$$-17x \quad -\cancel{17x}$$

$$\frac{-\cancel{2}x}{-\cancel{2}} = \frac{34}{-2}$$

$\boxed{x = -17}$

Homework: 4/5
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